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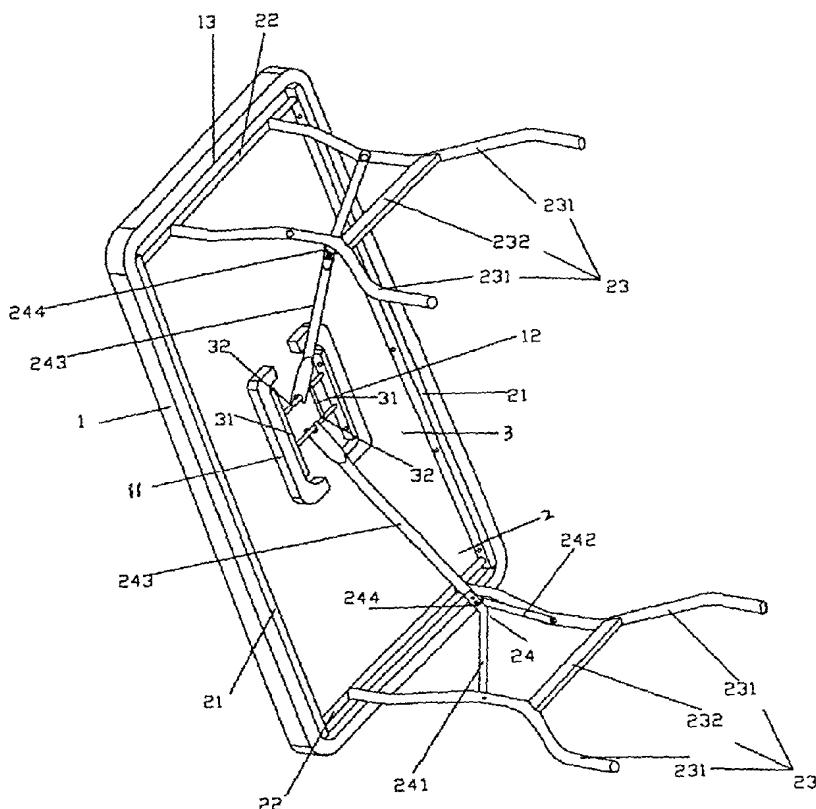
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**(54) Title: FOLDING TABLE WITH HANDLES**



**(57) Abstract:** A table includes a table top and a table frame. The table frame preferably includes one or more side rails, end rails, table legs, and support braces. The table also includes a mounting structure that is provided on the underside of the table top. At least a portion of a support assembly is connected to the mounting structure. Preferably, one end of the support braces is pivotally attached to the support assembly and the other end is pivotally attached to a table leg. Advantageously, the support assembly provides a "planar" support area to a portion of the table top. In addition, the table includes handles for enabling a person to transport the table.



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## FOLDING TABLE WITH HANDLES

### CROSS-REFERENCE TO RELATED APPLICATIONS

[001] This application claims priority to and benefit of Chinese Application No. 02270466.3 filed October 24, 2002 and entitled "Folding Table with Handle," which application is incorporated herein by reference in its entirety.

### BACKGROUND OF THE INVENTION

#### The Field of the Invention

[002] The present invention generally relates to furniture such as tables and, in particular, to folding tables with handles.

#### The Relevant Technology

[003] A wide variety of tables are well known in the art and used for a variety of purposes. For example, a well-known type of table is commonly referred to as a utility table. Conventional utility tables often include two leg assemblies that are pivotally connected to the table top. The leg assemblies are typically movable between a collapsed position in which the legs are located near the lower surface of the table top and an extended position in which the legs extend outwardly from the table top.

[004] A conventional folding table that can be used, for example, for outdoor activities is shown in Figure 4. Its main components include a table top 1' and table frame 2'. As shown in Figure 4, the table frame 2' includes two side rails 21', three cross bars 22', two sets of foldable legs 23', and two support braces 24'. The side rails 21' are typically fastened to the underside of the table top 1'. The three cross bars 22' are separately and pivotally attached to both ends and the middle portion of

the side rails 21'. The two sets of table legs 23' are connected to the cross bars 22' that are located near the ends of the side rails 22'. In addition, one end of each support brace 24' is fastened to the table leg 23' and the other end of the support brace is pivotally attached to the cross bar 22' that is attached to the center portion of the side rails 21'.

**[005]** When folding the table legs 23' of the conventional table shown in Figure 4 into the collapsed position, one typically turns the table top 1' so that the underside of the table top is facing upwards. The table legs 23' are then folded downwardly towards the table top. Because the cross bars 22' that are fastened to the table legs 23' are pivotally attached to the side rails 21', and the support braces 24' are pivotally attached to the table legs 23', the table legs 23' come to rest on the underside of the table top 1', thus reducing its volume.

**[006]** The center portion of the table top 1' of this type of conventional folding table, however, is only supported by one cross bar 22' that pivotally attached to the two support braces 24'. This may allow the center portion of the table to undesirably deflect, shift or move. In addition, if the cross bar 22' in the center portion of the table top is damaged, the entire table frame 2' must be removed in order to repair or replace the damaged cross bar. Removing the entire table frame 2' from the table top 1' typically requires a significant amount of time and effort.

**[007]** Additionally, once the table is folded, the user must grip the table by the perimeter of the table top or part of the table frame. Where the table top or frame is heavy, it becomes difficult for a person to transport the table in such a manner. Even where the table is constructed of lighter material, the dimensions of the table make it unwieldy for a person to carry.

## BRIEF SUMMARY OF THE INVENTION

[008] A need therefore exists for a table that eliminates the above-described disadvantages and problems.

[009] One aspect of the invention is a table with legs that are movable relative to the table top between a collapsed position in which the legs are positioned proximate the lower surface of the table top and an extended position in which the legs extend outwardly from the table top. The table legs are preferably securely connected to the table top and the table legs may securely support the table top above a surface such as the floor. The table also includes handles for assisting a person in transporting the table when folded.

[010] Another aspect is a folding table that includes a table top with a top surface and a bottom surface; a mounting structure centrally disposed on the bottom surface of the table top, the mounting structure forming a unitary storage space on the bottom surface of the table top; a support assembly at least partially connected to the mounting structure; and a frame assembly including a first leg connected to the bottom surface of the table top; a support brace having a first end and a second end, the first end being attached to the first leg and the second end being attached to the support assembly; and at least one handle disposed underneath the bottom surface of the table top.

[011] The mounting structure may include a pair of C-shaped mounting ridges formed on the bottom surface of the table top.

[012] The support assembly may include a pair of spaced apart side rails configured to be attached to the mounting structure; and a first cross bar disposed transverse to the pair of side rails.

[013] The support assembly may include a pair of spaced apart side rails configured to be attached to the mounting structure; and a pair of spaced apart end rails disposed transverse to the pair of side rails.

[014] The support assembly may be formed integrally with the table top.

[015] The table top may be formed of blow-molded plastic.

[016] The mounting structure may be formed of blow-molded plastic.

[017] The frame assembly may include a pair of spaced apart side rails and a pair of spaced apart end rails disposed transversely to the pair of side rails and connected therebetween, wherein the table leg is connected to one of the pair of end rails.

[018] The frame assembly may include a second leg connected to the bottom surface of the table top; and a second support brace having a first end and a second end, the first end being attached to the second leg and the second end being attached to the support assembly, wherein the unitary storage structure is configured to receive at least a portion of the first leg and at least a portion of the second leg when the first leg and the second leg are in a folded position.

[019] The handle may include a cross rail connected to the mounting structure, wherein the cross rail is disposed transverse to the pair of end rails and attached therebetween.

[020] The handle may include a groove formed between the bottom surface of the table top and the mounting structure. The groove may be formed on the bottom surface of the table top and/or the outside edge of the mounting structure.

[021] The handle may also comprise a ridge or bracket disposed on the bottom surface of the table top. A pair of ridges or brackets may be disposed at each end of the table top.

[022] The handle may further be formed integrally with the table top in a blow-molded process.

[023] A further aspect is a table in which the center portion of the table is supported by the central support assembly. Preferably, the support braces are pivotally attached to the central support assembly, but the support braces do not have to be pivotally attached to the central support assembly. Advantageously, the central support may provide increased support for the center portion of the table. In addition, the central support assembly and/or the mounting structure provides a "planar" support strength that may be greater than the "linear" support strength of conventional tables.

[024] The handle(s) provides a convenient means for conveying the table in the folded position. The handle may be configured in a variety of structures and configured to accommodate one or more persons carrying the table.

[025] In addition, if the central support assembly is damaged, all that is required is to detach it from the mounting structure to repair it. It is not necessary to detach the parts of the outer support assembly, and thus less time and effort is required for maintenance.

[026] These and other objects and features of the present invention will become more fully apparent from the following description and appended claims, or may be learned by the practice of the invention as set forth hereinafter.

## BRIEF DESCRIPTION OF THE DRAWINGS

[027] To further clarify the above and other advantages and features of the present invention, a more particular description of the invention will be rendered by reference to specific embodiments thereof which are illustrated in the appended drawings. It is appreciated that these drawings depict only typical embodiments of the invention and are therefore not to be considered limiting of its scope. The invention will be described and explained with additional specificity and detail through the use of the accompanying drawings in which:

[028] Figure 1 illustrates a perspective view of a folding table according to one embodiment of the invention;

[029] Figure 2 illustrates a perspective view of a folding table according to another embodiment of the invention;

[030] Figure 3 illustrates a perspective view of a folding table according to yet another embodiment of the invention.

[031] Figure 4 illustrates a perspective view of a conventional folding table.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[032] The present invention is generally directed to structures having reinforced center regions provided by a generally "H"- shaped center support. Advantageously, the "H"-shaped center support may provide a "planar" support structure versus the "linear" support structure that was provided in conventional tables. The "H"-shaped center support may provide added strength to the structure, whether the structure is a table, chair, shelf, or other type of furniture. While the present invention is described with relation to a folding table, it will be appreciated that the "H"-shaped center support may be used in connection with other suitable types' structures. In addition,

the present invention is generally directed to structures having handles which assist in transporting the structure.

**[033]** As shown in Figure 1, an exemplary folding table includes a table top 1, a table frame 2, and a support assembly 3. Table top 1 can be constructed out of plastic such as, but not limited to, blow molded plastic or injection molded plastic. Other suitable materials include, but are not limited to wood and metal. Table top 1 includes a perimeter 13.

**[034]** Table frame 2 includes two spaced apart side rails 21, two spaced apart cross bars or end rails 22 that are connected to the side rails, two sets of table leg sets 23 connected to the end rails, and two support braces 24. Each side rail 21 is fastened to the underside of one side of table top 1. The side rails 21 include connecting apertures at each end. An end rail 22 is disposed in the facing connecting apertures of a pair of side rails 21.

**[035]** Each table leg set 23 includes a pair of table legs 231 and a cross bar 232. One end of each table leg set 23 is fastened to an end rail 22. The support braces 24 are constructed from three support bars 241, 242, and 243. One end of the first and second support bars 241 and 242 is separately and pivotally attached to the lower part of the two table legs 231. The other ends converge and are pivotally attached to one end of the third support bar 243. The pivot area on this third support bar 243 is encircled by a sliding locking ring 244 so that, when the table is supported, the force of gravity detains the first and second support bars 241 and 242, preventing the table leg sets 23 from folding and thus increasing the firmness of the table legs 23. The other end of the third support bar 243 is pivotally attached to the support assembly 3.

**[036]** A fastening or mounting structure 11 is formed on the underside of the table top 1. In one embodiment, the mounting structure 11 includes a pair of

generally C-shaped mounting bases or ridges each mounting ridge having an elongate central portion and two shorter end portions or stop plates. The mounting ridges form two convex-shaped structures that face each other so that a box-like region is formed at the center of table top 1.

**[037]** The mounting structure 11 can be formed integrally with table top 1 during the blow-molded process or injection molding process to form a one-piece structure. Thus, the mounting structure 11 is formed in a single step and does not require additional manufacturing or cooling time. Alternatively, the mounting structure 11 could be formed from discrete parts and later attached or adhered to table top 1. The mounting structure 11 is configured to support at least a portion or the entire support assembly 3.

**[038]** The support assembly 3 is connected to mounting structures 11 within perimeter 13. The support assembly 3 is preferably constructed with a generally "H"-shape configuration with two side rails 31 and two cross bars or end rails 32. Each side rail 31 is desirably attached to the inside surface of a mounting ridge of the mounting structure 11. The side rails 31 include connecting apertures at each end. An end rail 32 is disposed in the facing connecting apertures of a pair of side rails 31. An end of the third support bar 243 of a support brace 24 is pivotally attached to an end rail 32. In the embodiment of Figure 1, a handle 12 is disposed transversely to end rails 32 and connected therebetween. One skilled in the art will appreciate that the support assembly 3 could have other suitable shapes and configurations depending, for example, upon the intended use of the table.

**[039]** Because the support assembly 3 has a generally "H"-shaped structure, the support assembly 3 provides a "planar" support structure to the central portion of table top 1. It will be appreciated that the generally "H"-shaped structure of the

support assembly 3 may be formed from two side rails 31 and two end rails 32 or from a single end rail 32 disposed between a pair of end rails 31 (forming a true "H"). A "planar" support structure distributes forces along the plane. In contrast, the center portion of a conventional table top was often supported by a "linear" structure in which the forces were focused along a central line. Thus, failure of the table top 1 is more likely with a "linear" structure than with a "plane" structure. Therefore, the embodiments of the present invention provide unique mounting structures for support braces 24 which ultimately provide greater support strength for the table top 1.

**[040]** In addition, when support assembly 3 is damaged, it can be replaced or repaired simply by detaching the two side rails 31. Thus, there is no need to go to the trouble of disassembling the entire table frame 2. Furthermore, the ridge-shaped nature of the mounting ridges provides that fastening structure such as bolts, rivets, nails and the like are protected from exposure. Of course, any suitable type of fastener or connectors could be used to attached the support assembly 3 to the table or assemble the table.

**[041]** In order to fold the table into the collapsed or storage position, the table is preferably turned upside down with the underside facing up. Under the effect of gravity, the locking ring 244 may automatically slide down under the effect of its own weight and will remove the constraint on the pivoting region of the support braces 24. Applying force to the pivoting region folds the two sets of table leg sets 23 in a downwards direction. The table leg sets 23 will come to rest on the underside of the table top 1, thus facilitating storage or transport. By picking up the table by handle 12, a person can easily transport the folding table.

**[042]** With reference to Figure 2, an alternative embodiment of a folding table is shown. The embodiment of Figure 2 does not require the use of side rails 21. Further

details regarding a folding table without side rails is found in Chinese Patent Application No. 02269593.1, filed September 24, 2002, entitled "UTILITY TABLE WITH NO SIDE RAIL," which application is hereby incorporated by reference in its entirety. In addition, disposed between the mounting structure 11 and table top 1 is a handle 12. In the embodiment of Figure 2, the handle 12 includes a groove formed at the outer edge of one or both mounting ridges of the mounting structures 11. The groove may be formed in the bottom surface of the table top 1 or may be formed in the mounting structure 11. In addition, the groove may be formed during a blow-molded process which, advantageously, reduces the number of manufacturing steps and manufacturing parts.

**[043]** In Figure 3, another embodiment of the handles of the folding table is shown therein in which the handles 12 are composed of a pair of ridges or brackets which are attached to each end of the underside of table top 1. Handles 12 are disposed substantially parallel to each other. Alternatively, the handles 12 may be offset from each other. This embodiment may be particularly useful where two people are transporting the folding table, providing a handle 12 for each person.

**[044]** The present invention may be embodied in other specific forms without departing from its spirit or essential characteristics. The described embodiments are to be considered in all respects only as illustrative and not restrictive. The scope of the invention is, therefore, indicated by the appended claims rather than by the foregoing description. All changes which come within the meaning and range of equivalency of the claims are to be embraced within their scope.

## CLAIMS

What is claimed is:

1. A table comprising:
  - a table top having a top surface and a bottom surface;
  - a mounting structure centrally disposed on the bottom surface of the table top;
  - a support assembly at least partially connected to the mounting structure;
  - a frame assembly comprising:
    - a first leg connected to the bottom surface of the table top; and
    - a support brace having a first end and a second end, the first end being attached to the first leg and the second end being attached to the support assembly; and
  - at least one handle disposed underneath the bottom surface of the table top.
2. The table as recited in claim 1, wherein the mounting structure comprises a pair of C-shaped mounting ridges formed on the bottom surface of the table top.
3. The table as recited in claim 1, wherein the support assembly comprises:
  - a pair of spaced apart side rails configured to be attached to the mounting structure; and
  - a first cross bar disposed transverse to the pair of side rails and attached therebetween.

4. The table as recited in claim 1, wherein the support assembly comprises:  
a pair of spaced apart side rails configured to be attached to the mounting structure; and  
a pair of spaced apart end rails disposed transverse to the pair of side rails and attached therebetween.
5. The table as recited in claim 1, wherein the support assembly is formed integrally with the table top.
6. The table as recited in claim 1, wherein the table top is formed of blow-molded plastic.
7. The table as recited in claim 1, wherein the mounting structure is formed of blow-molded plastic.
8. The table as recited in claim 1, wherein the frame assembly further comprises a pair of spaced apart side rails and a pair of spaced apart end rails disposed transversely to the pair of side rails and connected therebetween, wherein the table leg is connected to one of the pair of end rails.
9. The table as recited in claim 1, wherein the at least one handle comprises a cross rail connected to the mounting structure.

10. The table as recited in claim 4, wherein the at least one handle comprises a cross rail disposed transverse to the pair of end rails and attached therebetween.

11. The table as recited in claim 1, wherein the at least one handle comprises a groove formed between the bottom surface of the table top and the mounting structure.

12. The table as recited in claim 1, wherein the at least one handle comprises a groove formed on the bottom surface of the table top.

13. The table as recited in claim 1, wherein the at least one handle comprises a groove formed on the outside edge of the mounting structure.

14. The table as recited in claim 1, wherein the at least one handle is formed integrally with the table top in a blow-molded process.

15. The table as recited in claim 1, wherein the at least one handle comprises a bracket disposed on the bottom surface of the table top.

16. The table as recited in claim 15, wherein the bracket is disposed at one end of the table top.

17. The table as recited in claim 1, wherein the handle comprises a ridge formed on the bottom surface of the table top.

## DESCRIPTION DRAWINGS

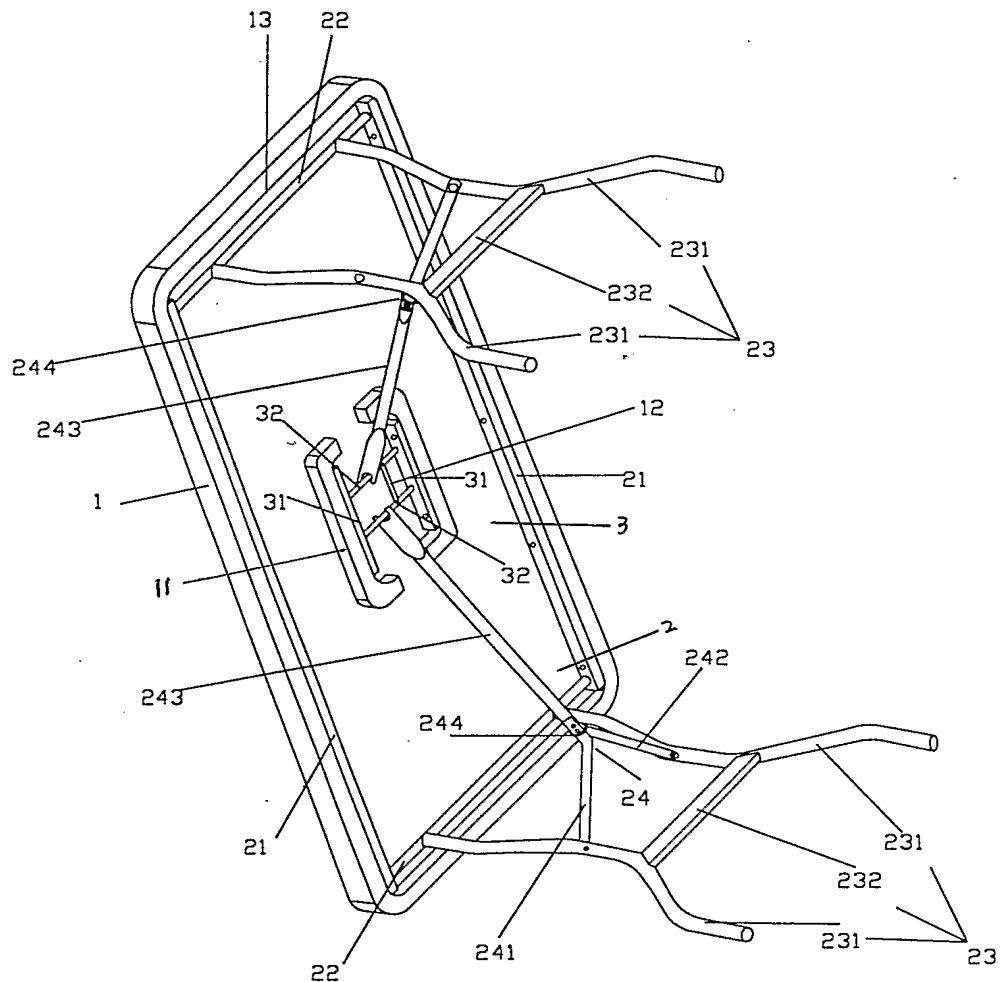


FIG1

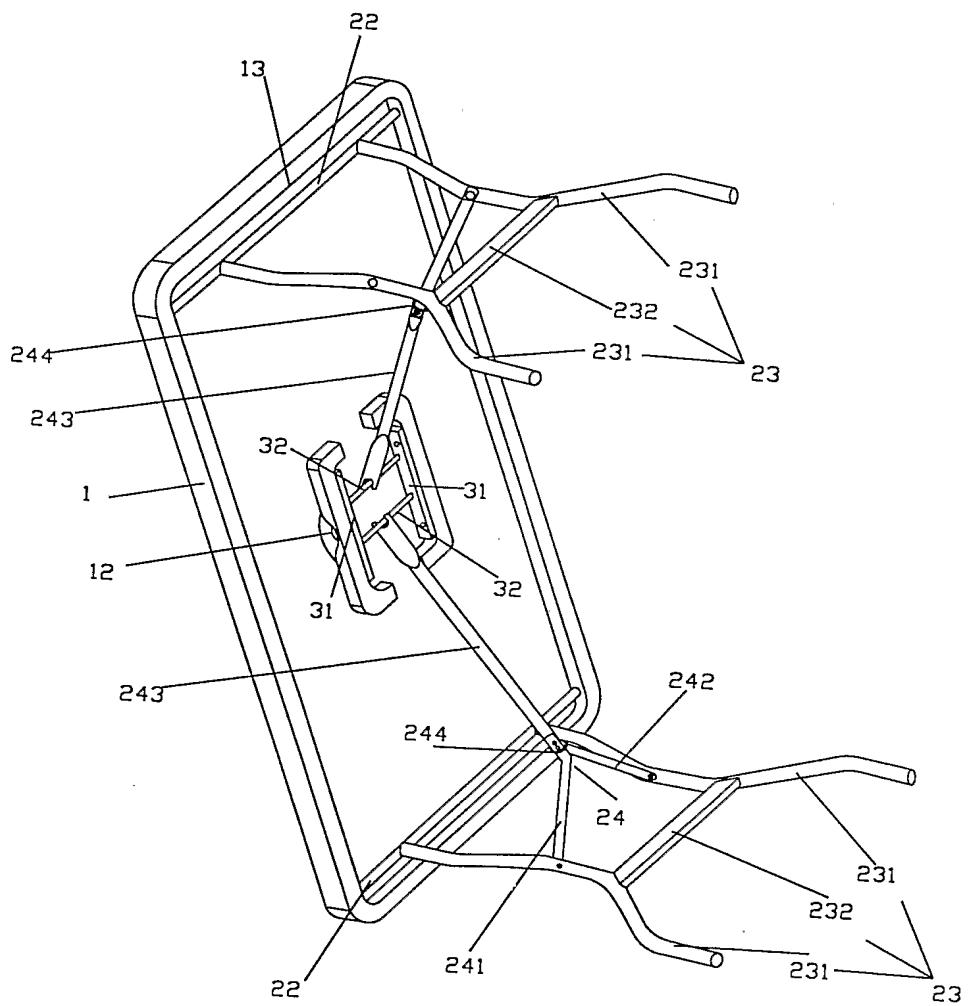


FIG2

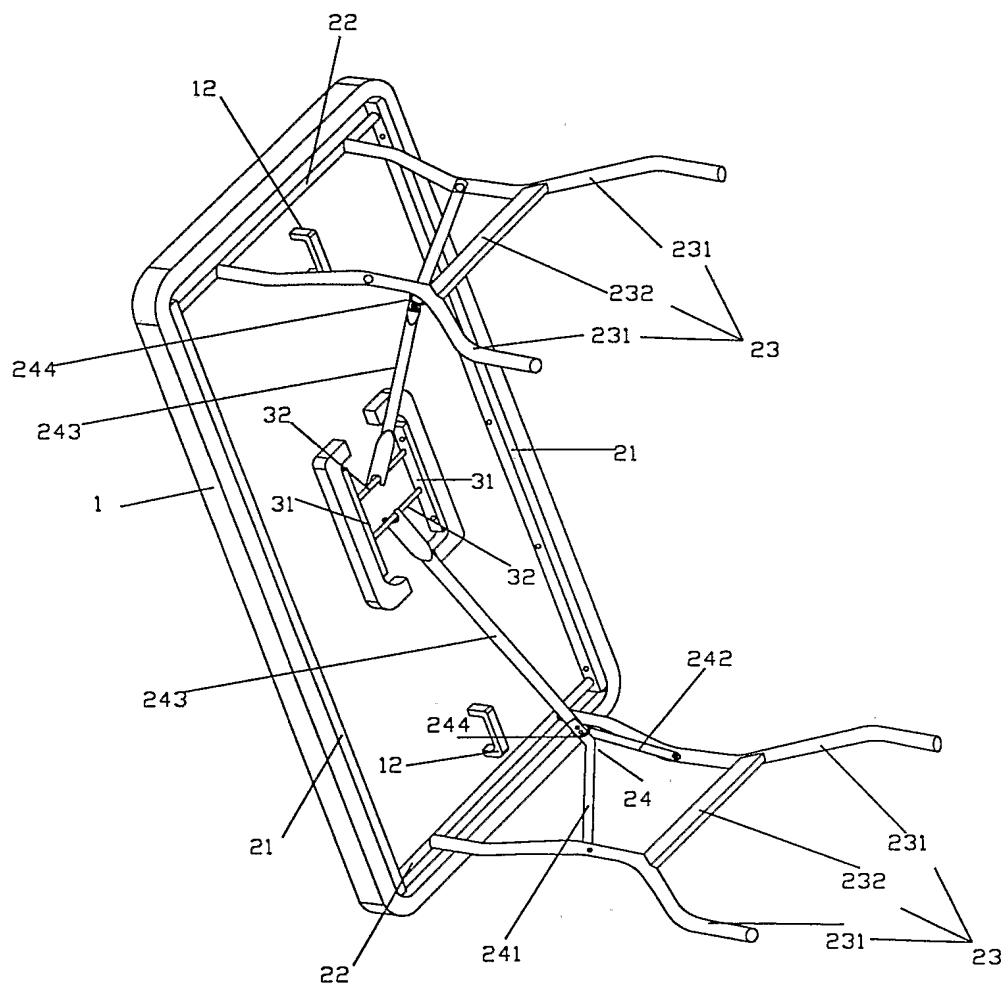


FIG3

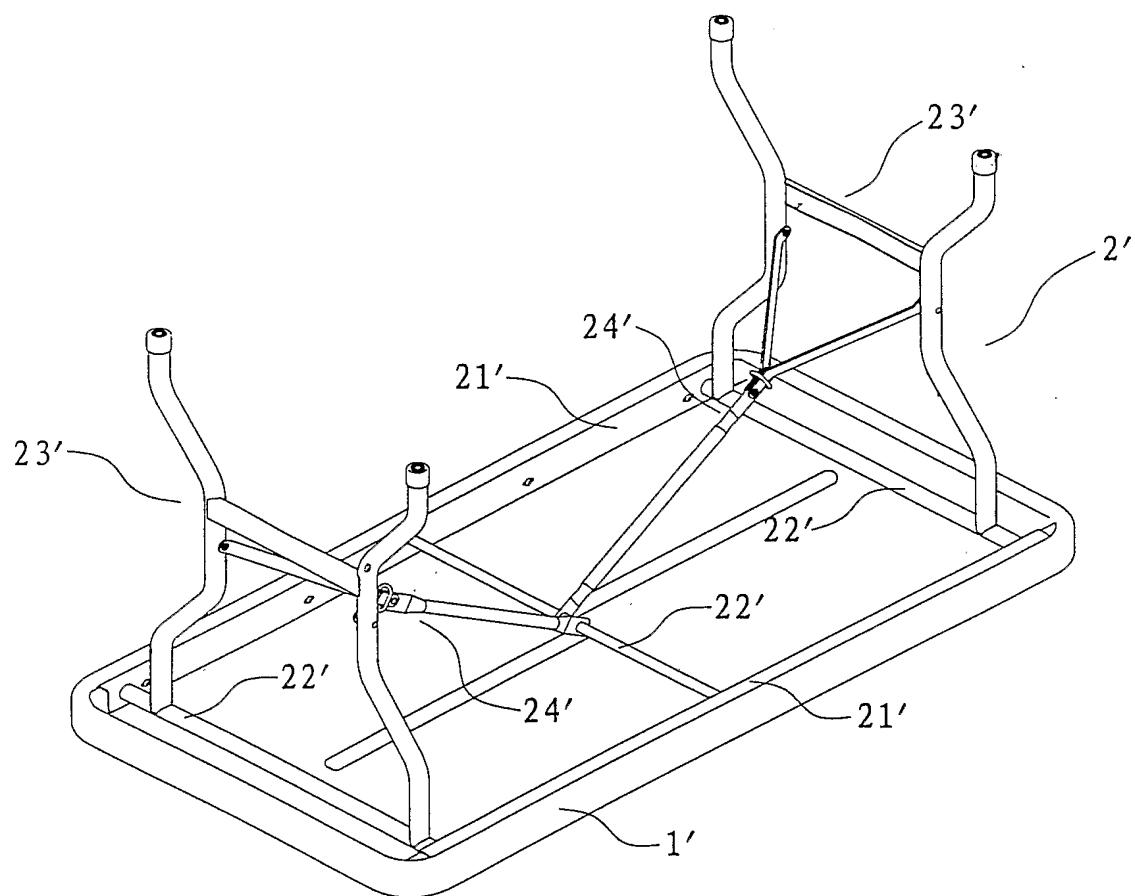


FIG4